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(54) Stream Feeder

(57) A feeder 10 is provided for supply molten mineral in the form of streams. The feeder comprises upwardly extending sidewalls 16, 17, a bottom wall extending between the sidewalls, the bottom wall having a plurality of orifices 20 through which molten mineral material is supplied in the form of streams, and bottom wall supporting means comprising a support member (30, 32) extending between the bottom wall and a first sidewall (16, 17 respectively), the member being generally in spaced apart relationship with the bottom wall and the sidewall except at the end regions (34, 38 or 36, 40 respectively) of the member.

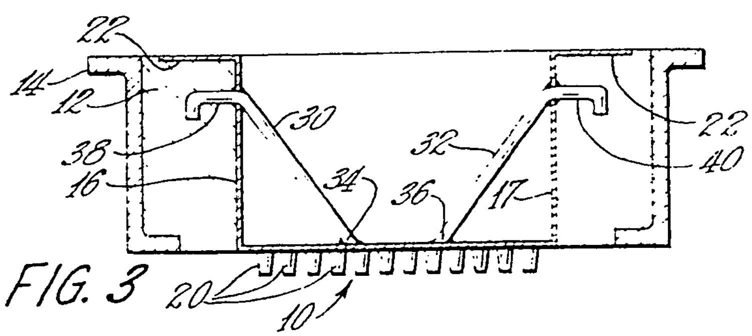

FIG. 3

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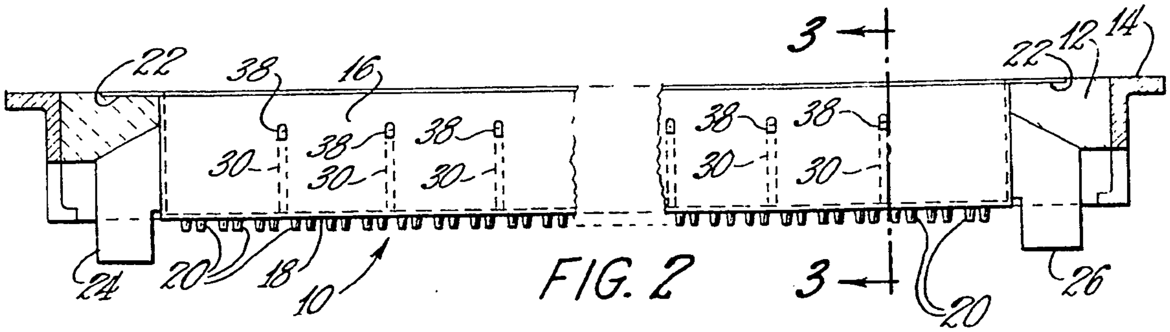

FIG. 2

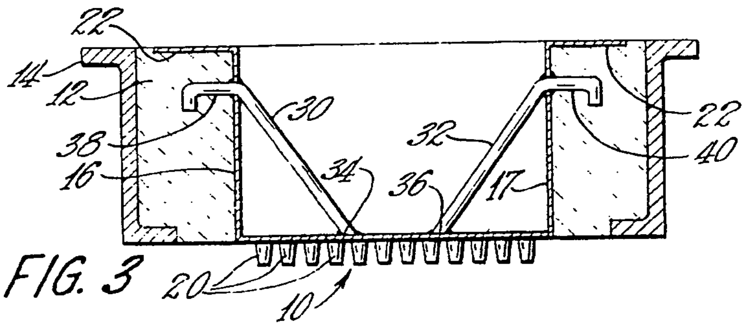

FIG. 3

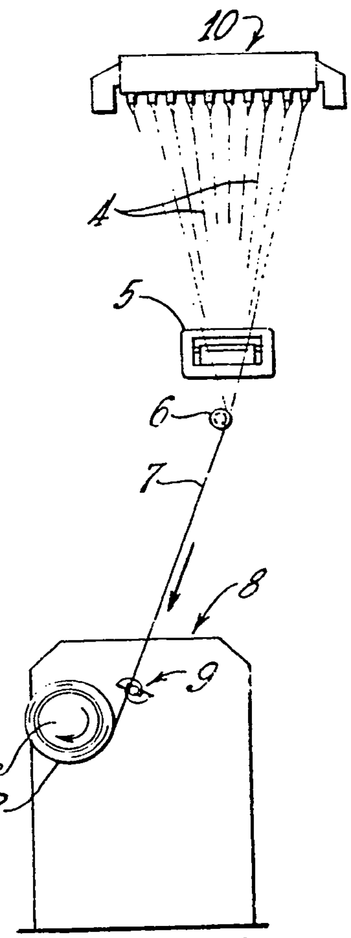

FIG. 1

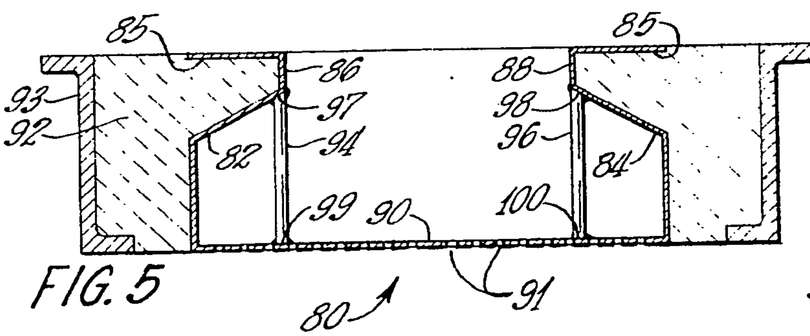

FIG. 5

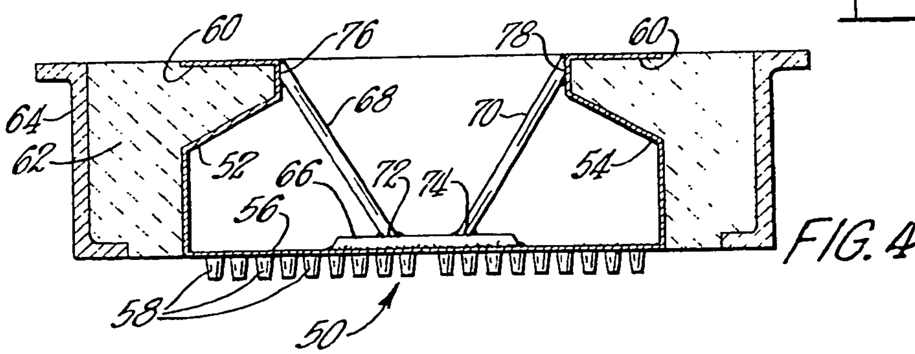

FIG. 4

SPECIFICATION

Stream Feeder

This invention relates to apparatus for melting heat softenable material and more specifically to an internal supporting means for stream feeders through which streams of molten mineral material, such as glass, are supplied for attenuation into fibers.

There has been a trend in recent years toward making a large number of filaments from a single stream feeder. This trend has resulted in larger stream feeders with correspondingly larger bottom walls to accommodate the larger number of orifices or tips from which streams are supplied to be attenuated into fibers. The larger bottom walls are subjected to a greater overall load and tend to sag or creep sooner than bottom walls having smaller areas.

Attempts have been made heretofore to overcome this problem of creep or sag through special bushing designs and through supports under the bushing bottoms. However, such attempts have met with limited success, often being ineffective in reducing excessive creep or sag to extend the bushing life appreciably. Such supports have also tended to interfere with the heat pattern of the bushing bottom or have physically interfered with the attenuation of fibres, resulting in a tendency to disrupt the fiber forming operation. Other attempts to reduce sag have required an extensive amount of extremely expensive alloy of which the bushings are made. Further attempts to reduce sag have been made by extending hollow elongate members having refractory rods therein between upright walls of the stream feeder above the bottom wall and connecting the elongate members to the bottom plate by welding gussets or plates to the elongate members and the bottom wall of the stream feeder.

Summary of the Invention

The present invention comprises a feeder for supplying molten mineral material in the form of streams. The feeder comprises upwardly extending walls, a bottom wall extending between the sidewalls, the bottom wall having a plurality of orifices through which molten mineral material is supplied in the form of streams, and bottom wall supporting means comprising a member extending between the bottom wall and a first sidewall, the member being generally in spaced apart relationship with the bottom wall and the sidewalls except at the end regions of the member.

It is an object of the present invention to provide stream feeders for high temperature, heat-softenable materials.

Another object of the present invention is to provide a stream feeder with a support for the stream feeder bottom wall which does not interfere with the fiber forming operation.

A further object of the invention is to provide a stream feeder with an internal bottom wall support which reduces the tendency of the bottom wall to sag or creep.

These and other objects of the invention will become apparent as the invention is described hereinafter in detail with reference to the accompanying drawings.

Description of the Drawings

Figure 1 is a front elevational view of a general layout of a fiber forming operation in accordance with the present invention.

Figure 2 is a partial side elevational view of a stream feeder in accordance with the present invention.

Figure 3 is a cross-sectional view taken substantially along the line 3—3 of Figure 2.

Figure 4 is a cross-sectional view of another stream feeder in accordance with the present invention.

Figure 5 is a cross-sectional view of another stream feeder in accordance with the present invention.

Description of the Preferred Embodiments

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways to produce elements for other end uses. Also, it is to be understood that the phrasiology employed herein is for the purpose of description and not of limitation.

Referring now more particularly to the drawings, Figure 1 illustrates a fiber forming operation. Mineral material, such as glass, is maintained in a molten condition in the stream feeder assembly 10 from which a plurality of streams of material is emitted from the orifices in the feeder for attenuation into fibers 4. The fibers are gathered into a strand 7 by drawing them over a gathering shoe 6 while sizing is applied to the fibers by applicator 5 which supplies a sizing to each filament above the point of collection at the gathering member 6. The strand 7 formed of the gathered fibers is packaged by a winder 8 which traverses the strand by a suitable traversing device such as a spiral wire traverse 9 and which collects the strand on a rotating collet 3 into a package 2.

Figures 2 and 3 illustrate a stream feeder assembly 10 generally as shown in Figure 1. The stream feeder is basically a box-shaped chamber made of high temperature resistant alloys such as platinum, rhodium, or the like. As illustrated in Figures 2 and 3, the feeder assembly comprises upwardly extending sidewalls and a bottom wall extending between the sidewalls. As shown, at least two of the sidewalls can have electrical terminals 24 and 26 extending therefrom. Electrical bus bars (not shown) can be connected to the terminals for supplying current through the feeder. The feeder can thus heated by its own

electrical resistance. The terminal sidewalls and the other sidewalls 16 to 17 are connected together and with the bottom wall 18 to form the box-like stream feeder.

The upper portion of the sidewalls form a flange 22 extending around the stream feeder. The stream feeder is mounted in a frame 14 for attachment of the stream feeder to the glass supply (not shown). Deposited between the sidewalls of the stream feeder and the mounting frame is a refractory material 12 which minimizes heat loss from the glass in the stream feeder and which supports the sidewalls and flange of the stream feeder.

The bottom wall 18 can be adapted with a plurality of tips through which the molten mineral material is supplied in the form of streams. Alternately, the bottom wall can be tipless, that is, can have a plurality of orifices penetrating therethrough through which the molten glass is withdrawn.

In accordance with the invention, a stream feeder bottom wall is supported to reduce sag and to therefore extend the life of a stream feeder. A member or plurality of members extend between the bottom wall and the sidewalls to support the bottom wall. These members are generally in spaced apart relationship with the bottom wall and sidewalls except at the end regions of the members.

As shown in Figures 2 and 3 a plurality of wires extend between bottom wall 18 and sidewalls 16 and 17. In this embodiment, one end of wire 30 is connected to the mid region of the bottom wall 18 by any suitable means, preferably by weld 34. Wire 30 extends upwardly at an oblique angle from the bottom wall and passes through sidewall 16 where the other end of the wire 38 is connected or anchored in refractory material 12. Similarly, one end of wire 32 is attached to the mid region of the bottom wall by any suitable means, preferably by weld 36. Wire 32 extends upwardly at an oblique angle from the bottom wall and passes through sidewall 17 where the other end of the wire 40 is connected or anchored in the refractory material. As shown, there is a plurality of such wires 30 and 32. These wires support the stream feeder in such a manner that they do not interfere with the heat pattern of the stream feeder nor do they interfere with the fiber forming operation in any manner. As the bottom wall tends to sag or creep during operation of the stream feeder, the support wires are placed in tension and restrict the bottom wall from saging or creeping. The support wires 30 and 32 are shown to have a circular cross section, but it is understood that the cross section of the wires or members can be of any configuration. The members are shown as wires comprising a single strand of material. The wires can be a group of strands bundled or twisted together to function as a unit such as a cable. Also, the members can be rods or other linear or elongated elements. Wires made of a high temperature resistant platinum and rhodium alloy have been found to operate satisfactorily. However, other metallic or non-metallic members can be used. Wires having a circular cross section and a diameter of 60 mils to 125 mils have been found to operate satisfactorily. However, wires having either larger or smaller diameters can also be used. The number, and size, of the wires needed for a particular stream feeder can be determined by calculating the bottom wall stressing factors such as the load of the glass on the bottom wall of the stream feeder and the forming tension caused by the attenuation of the streams of glass into fibers.

Figure 4 illustrates another stream feeder according to the principles of the invention. Stream feeder 50 comprises upwardly extending sidewalls 52 and 54 connected to bottom wall 56. Tips 58 extend from the bottom wall for supplying molten mineral material in the form of streams therefrom. The stream feeder is mounted in frame 64 and refractory material 62 is disposed between the sidewalls and the frame. Flange 60 is an extension of the upper portion of the upwardly extending sidewalls. Support wires 68 and 70 can be connected directly to bottom wall 56. Or, as shown, a plate member 66 can be connected to the bottom wall 56 with wires 68 and 70 being connected to the plate member at welds 72 and 74, respectively. The other end of wire 68 is connected directly to in the region of the flange portion of wall 52 at weld 76. The other end of the wire 70 is connected directly to the region of the flange portion of wall 54 at weld 78. Although only two wires are shown in Figure 4, it is understood that a plurality of wires extending down the length of the feeder can be used. In operation, when the bottom wall begins to sag or creep, the support wires are placed in tension, and thus, the wires restrict the sagging or creeping of the bottom wall.

Figure 5 illustrates another embodiment of the invention. Stream feeder 80 comprises upwardly extending sidewalls 82 and 84 connected to bottom wall 90. The upper portions of the sidewalls form flange 85. In this embodiment, the tipless bottom wall has a plurality of orifices through which molten mineral material is supplied in the form of streams. The stream feeder is mounted in frame 93. Refractory material 92 is disposed between the frame and the sidewalls. One end of support wire 94 is attached to a side region of the bottom wall by any suitable means such as weld 99. The wire extends vertically from the bottom wall. The other end of the support wire is attached directly to a vertical portion 86 of the upwardly extending sidewall 82 by any suitable means such as weld 97. Similarly one end of support wire 96 is attached to a side region of the bottom wall 90 by any suitable means such as weld 100. The wire extends vertically from the bottom wall. The other end of the support wire is attached directly to a vertically extending portion 88 of the upwardly extending sidewall 84 by any suitable means such as weld 98. Although only two wires are shown in Figure 5, it is understood that a plurality of wires can be

used. During operation of the stream feeder, when the bottom wall begins to sag or creep, the support wires are placed in tension and, thus, restrict the creeping or sagging of the bottom wall.

It will be evident from the foregoing that various modifications can be made to this invention. Such, however, are considered to be within the scope of the invention as described in the following claims.

Claims

1. A feeder for supplying molten mineral material in the form of streams comprising:

a) upwardly extending sidewalls;

b) a bottom wall extending between the sidewalls, the bottom wall having a plurality of orifices through which molten mineral material is supplied in the form of streams, and

c) bottom wall supporting means comprising at least one support member extending between the bottom wall and a first sidewall, the member being generally in spaced apart relationship with the bottom wall and the side wall except at the end regions of the member.

2. A feeder according to claim 1, wherein the support member is of a metallic material.

3. A feeder according to claim 1 or claim 2, wherein the support member is of a high temperature resistant platinum and rhodium alloy.

4. A feeder according to any preceding claim, wherein the support member is a wire.

5. A feeder according to any of claims 1 to 3, wherein the support member is a group of strands bundled together to form a cable.

6. A feeder according to any preceding claim, wherein the support member is connected to the mid-region of the bottom wall.

7. A feeder according to any preceding claim, wherein the support member is connected directly to a first sidewall.

8. A feeder according to any preceding claim, wherein an upper portion of a first sidewall forms a flange.

9. A feeder according to claim 8, wherein the support member is connected to the first sidewall at the flange.

10. A feeder according to any preceding claim, wherein the support member extends obliquely from the bottom wall.

11. A feeder according to any of claims 1 to 9, wherein the support member extends vertically.

12. A feeder according to any of claims 1 to 7, wherein a refractory material extends along a portion of the outside surface of the sidewalls and is adapted to support the sidewalls.

13. A feeder according to claim 12, wherein the support member extends through a first sidewall and is connected to the refractory material.

14. A feeder according to any preceding claim, wherein the bottom wall supporting means comprises a plurality of said support members.

15. A feeder according to claim 14, wherein the bottom wall supporting means comprises a first support member extending between the bottom wall and first sidewall and a second support member extending between said bottom wall and a second sidewall.

16. A feeder according to claim 14, wherein the bottom wall supporting means comprises a plurality of said support members extending between the bottom wall and a first sidewall.

17. A feeder according to claim 14, wherein the supporting means comprises two rows of said support members extending respectively from said bottom wall to opposite sidewalls.

18. A feeder according to any preceding claim, wherein the bottom wall is adapted with a plurality of tips through which the molten mineral material is supplied in the form of streams.

19. A feeder according to claim 1 substantially as described herein with reference to Figures 1 to 3 or Figure 4 or Figure 5 of the accompanying drawing.

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